CERES FLASHFlux Status:
Near-Real Time Surface Radiative Fluxes and Meteorology for Research and Applications

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FLASHFlux Update

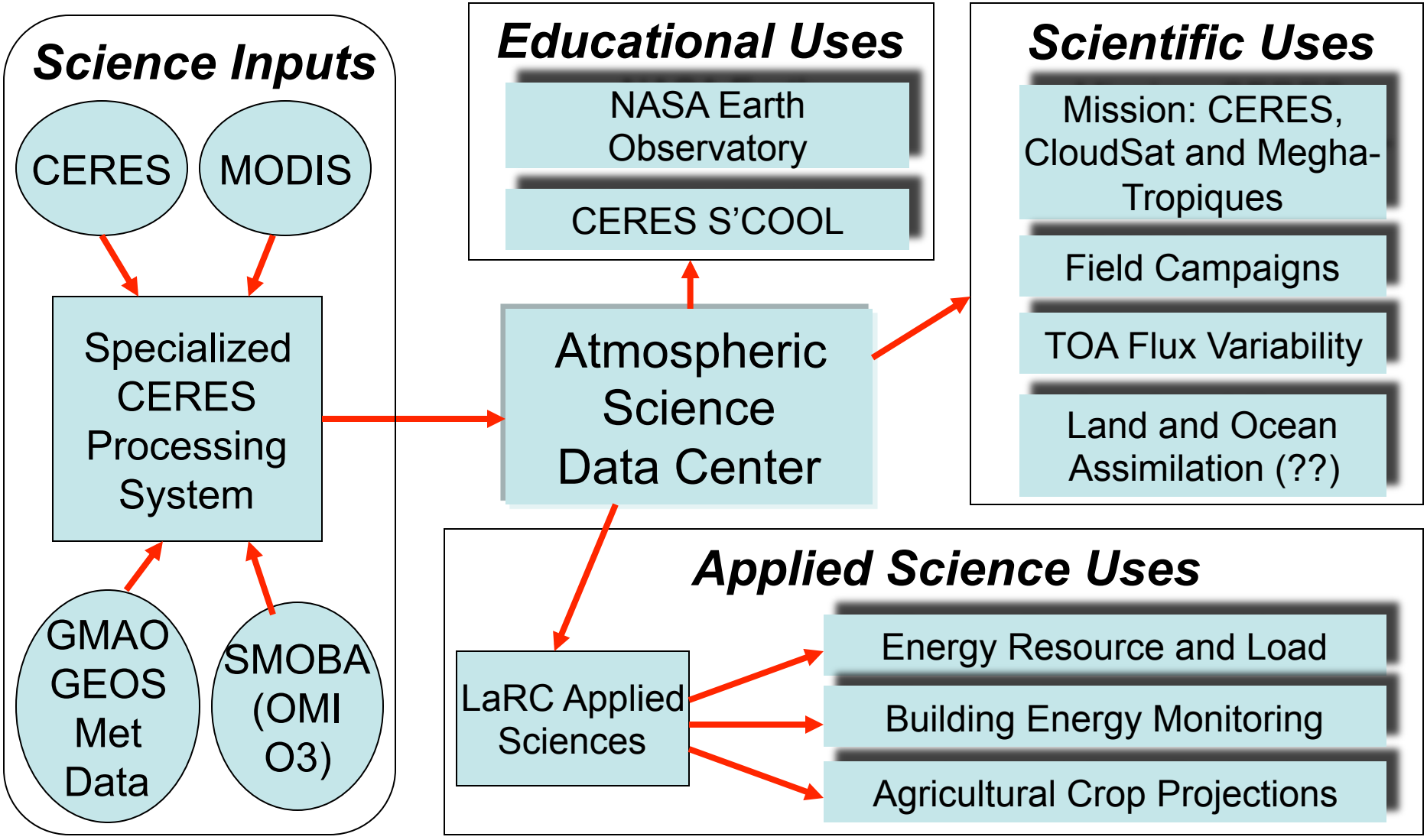
- ***Brief introduction***
- ***Publications***
  - SSF paper submitted; reviewers comments received
  - State of Climate Methodology and Results
- ***Promotion to v3A: current status***
  - Description of changes: New calibration, New reanalysis
    – GEOS 5.9 (FP-IT), Algorithm upgrades
  - Sample results
  - New web pages
- ***Plans***
  - Near-term promotion of 3A
  - Continued upgrades

FLASHFlux Overview

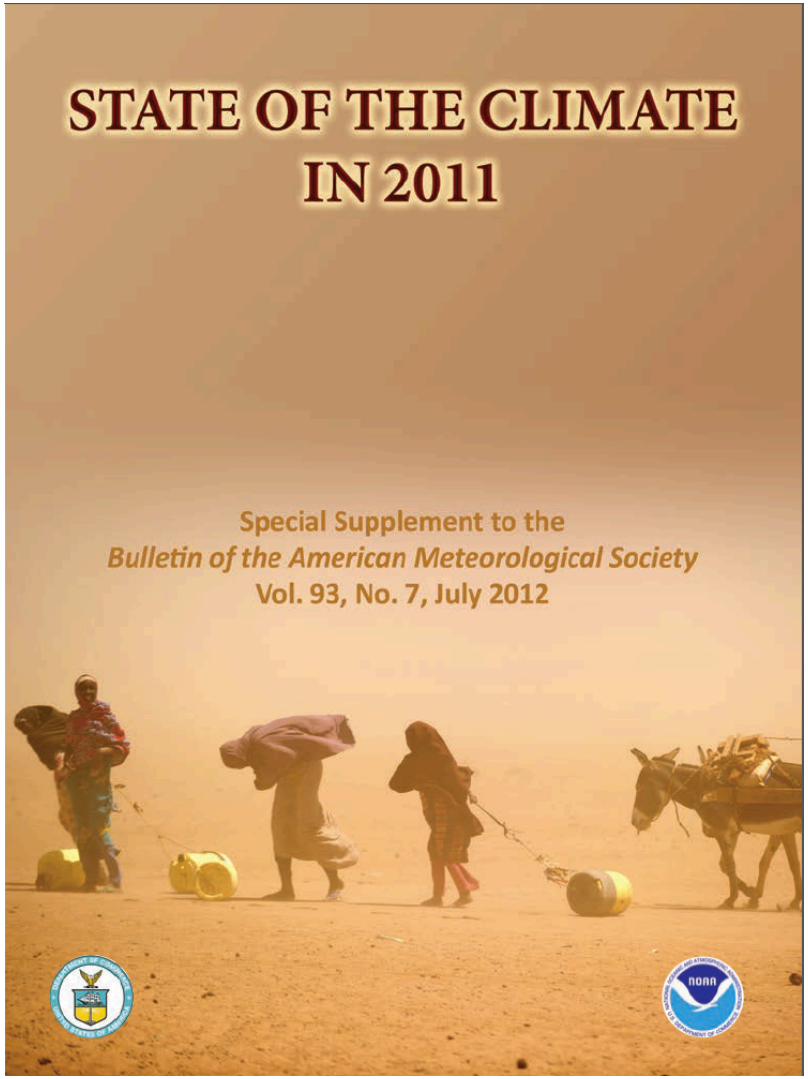
- ***FLASHFLUX = Fast Longwave And SHortwave Radiative Fluxes from CERES and MODIS***

- ***FLASHFlux Objectives***
  - Compute radiative fluxes from CERES and MODIS observations from both Terra and Aqua within one week of measurement (currently available within 4 days)
  - Global gridded and time averaged radiative flux and meteorological data sets using both Terra and Aqua when available (currently available within 6 days)
  - Conduct scientific investigations and provide for scientific and applied science uses
  - Demonstrate processing system pushing data products to research and applications uses

FLASHFLUX: Schematic Mapping to Realized and Potential Uses



State of the Climate 2012 Analysis



- *CERES FLASHFlux contributed to the special annual BAMS report on the "State of the Climate in 2011".*
- *Issue appeared in Aug. 2012, providing estimates of changes in year to year Global Earth Radiation Budget for the first time.*
- *These data have now been extended and used longer overlap with CERES EBAF products to contribute to this year's 2012 report.*

State of the Climate 2012 Analysis

CERES FLASHFlux TOA flux variability for 2011 for BAMS "State of the Climate" report:

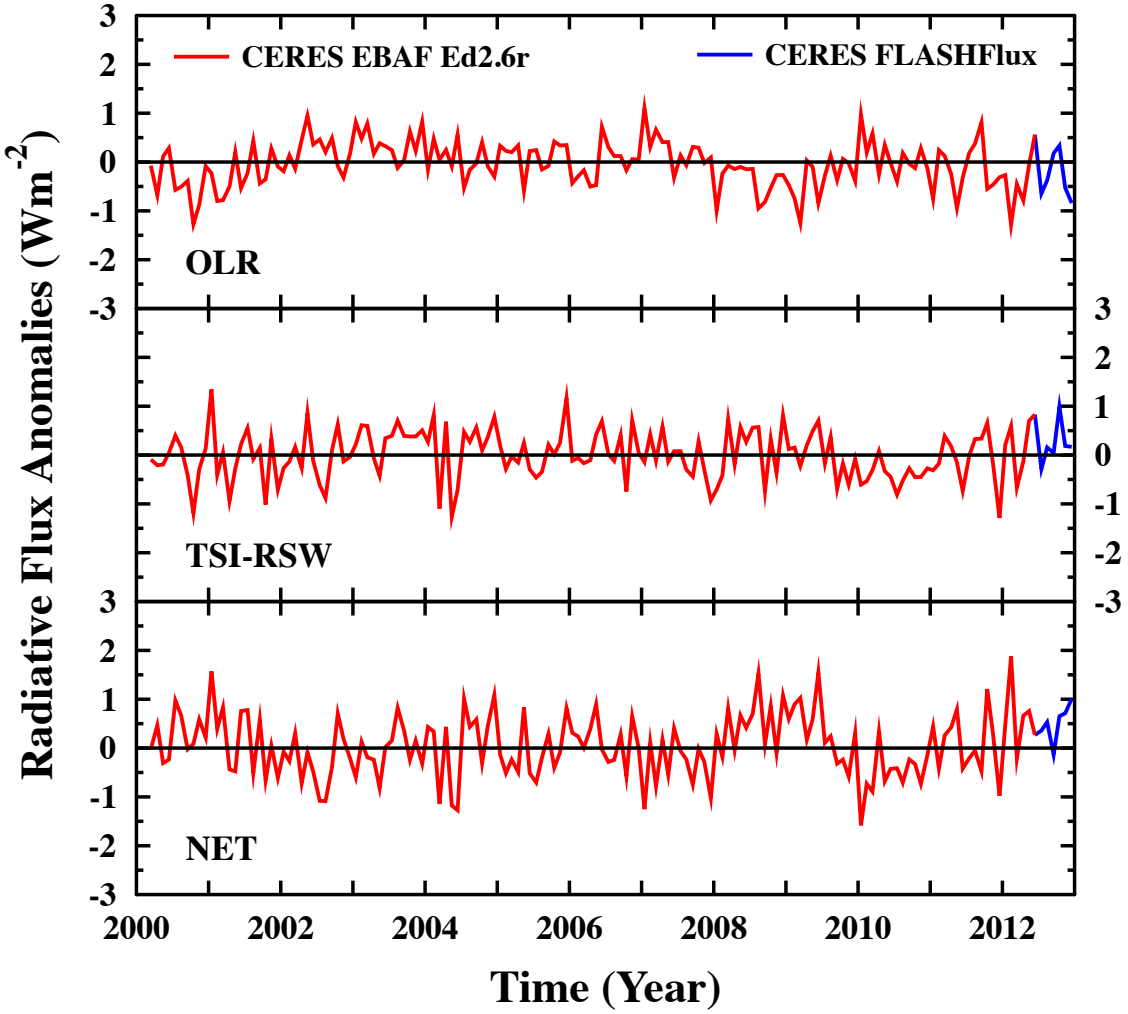
- FF monthly average annual global TOA normalized to EBAF from 7/2009 to 6/2012
  - Needed remove trend in calibration difference
- 2 σ monthly uncertainty (W m^{-2}) = ±0.14 Wm^{-2}, ±0.12 Wm^{-2} and ±0.18 Wm^{-2} for OLR/RSW/Total net
- TSI from SORCE instrument
- Global annual average anomalies:

	One year change (2012 minus 2011) (Wm^{-2})	2012 anomaly (relative to climatology) (Wm^{-2})	Interannual variability (2001 to 2011) (Wm^{-2})
OLR	–0.20	–0.35	±0.55
TSI	+0.05	+0.10	±0.20
RSW	–0.25	-0.15	±0.40
Net	+0.50	+0.60	±0.60

State of the Climate 2012 Analysis

- Time series show relatively large fluctuation

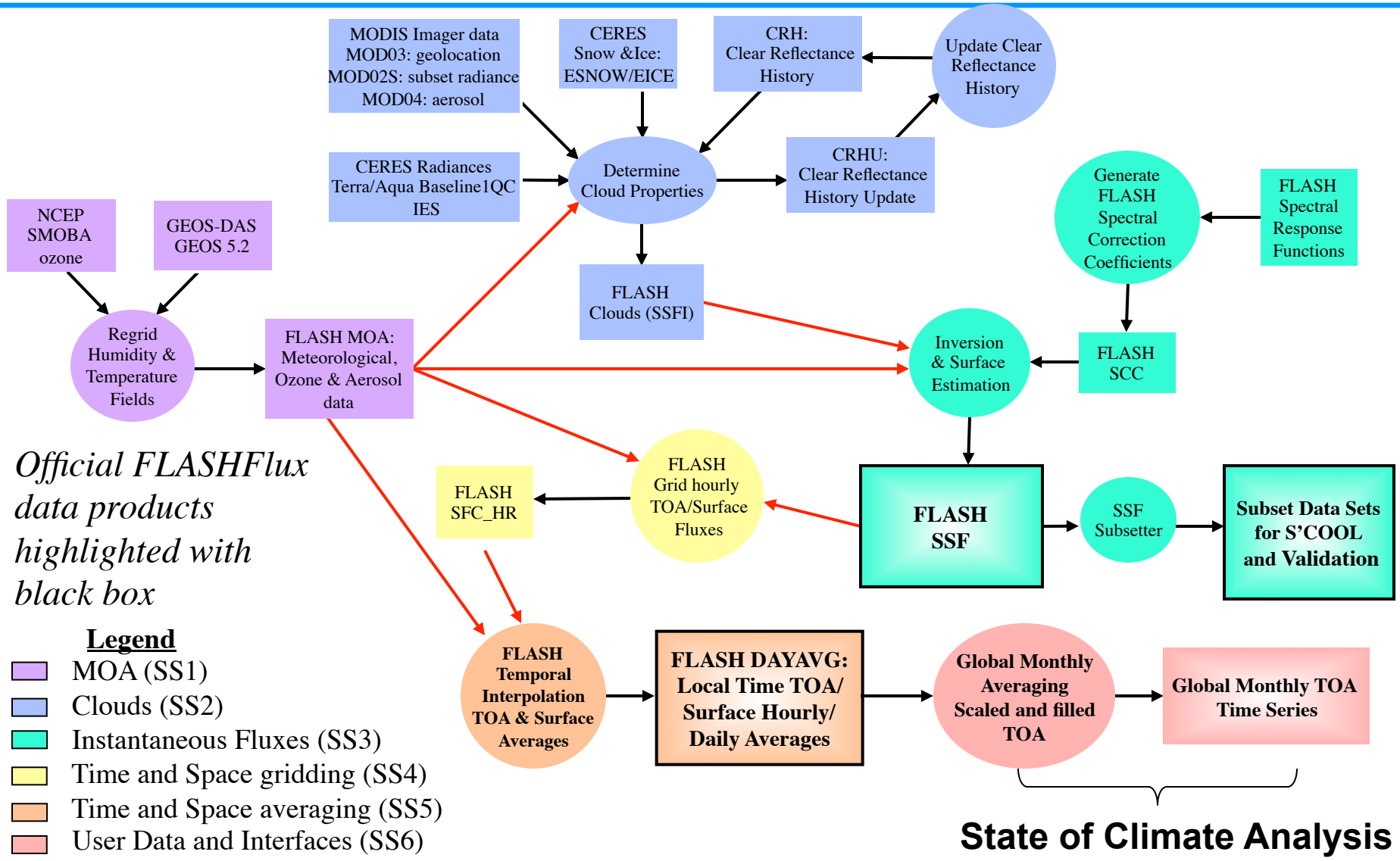
- Variability is consistent with NAO phase change



FLASHFlux Upgrade

- ***FLASHFlux v2H upgraded to v3A***
  - Data retroactively processed back to Jan 1, 2013 and processing forward to catch up to real-time
  - Production progressing; data sets publicly available
- ***Upgrade Changes***
  - Calibration upgrade to Ed 3
  - Upgrade MOA to use GEOS 5.9.1 (FP-IT)
    - Using GEOS estimates of ozone profile rather than SMOBA
  - Using AFWA snow/ice maps as processed by CERES
  - Algorithm upgrades
    - SW: Rayleigh scattering revision and MATCH aerosols
    - LW: high surface temperature and inversion corrections

FLASHFlux Data Flow (v2H)

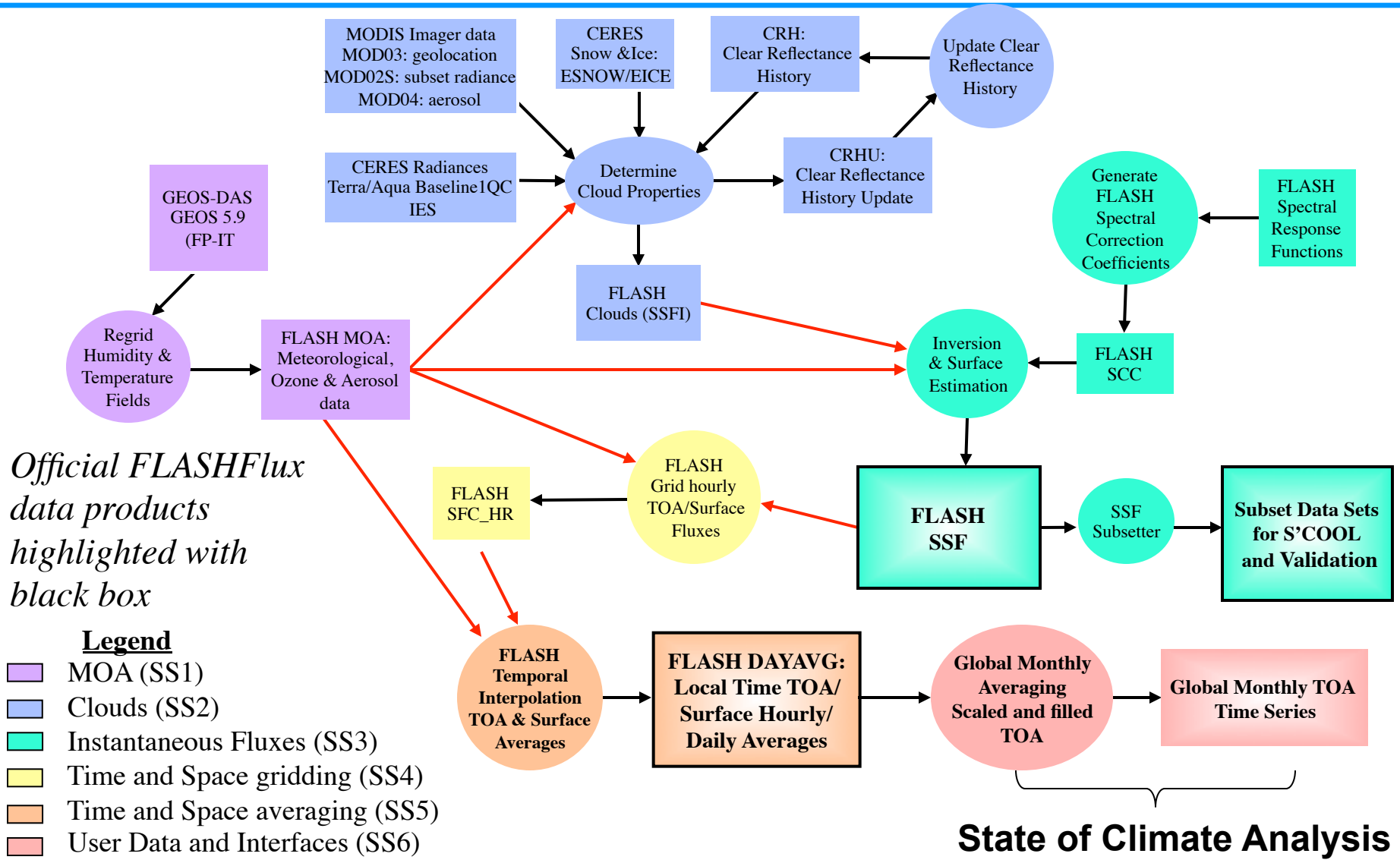


Official FLASHFlux data products highlighted with black box

Legend

- MOA (SS1)
- Clouds (SS2)
- Instantaneous Fluxes (SS3)
- Time and Space gridding (SS4)
- Time and Space averaging (SS5)
- User Data and Interfaces (SS6)

FLASHFlux Data Flow (v3A)



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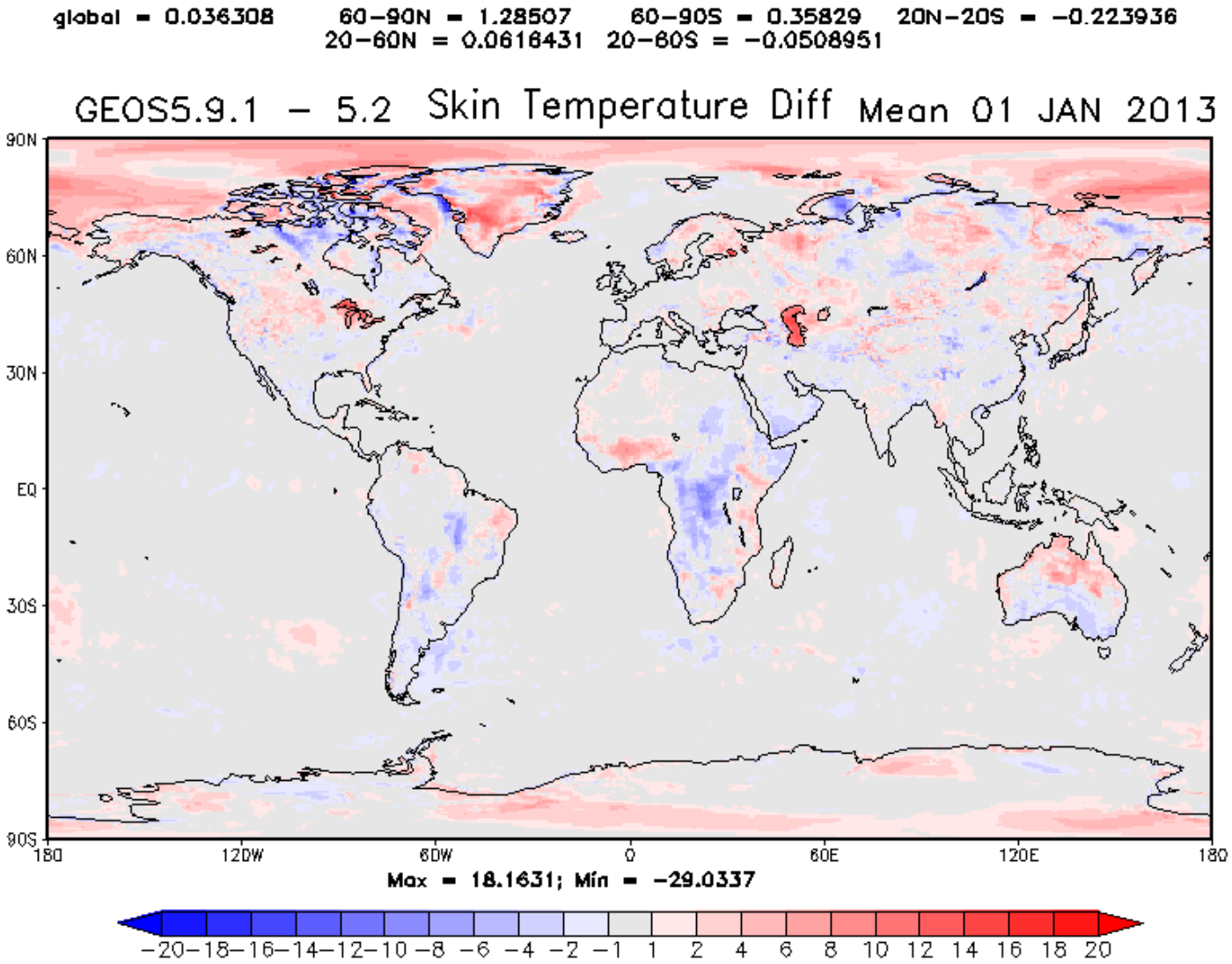
GEOS FP-IT

- ***GEOS FP-IT (Forward Processing – Investigative Team)***
  - New GEOS 5.9.1 version replaces operational version GEOS 5.2
    - 0.5^{o} latitude x 0.625^{o} longitude resolution
    - Hourly surface, 3 hourly upper air profile
  - Represents a reprocessed assimilation that is “semi-frozen” with changes before reviewed by the Investigator Team
    - Current being produced from the Jan 1, 2000 to present (3 streams RP-IT1, RP-IT2 and RP-IT3)
    - Production plans to be complete by Fall 2013
- ***Multiple changes from previous versions***
  - Assimilates AIRS radiances among many (HIRS3,4; AMSU-A, B, E; SSM/IS , MHS, IASI, etc. also assimilation GPS)
  - Produces chemistry products such as O3 (SBUV, OMI)
  - Features an aerosol assimilation (AOD MODIS Terra/Aqua)

Upgrade to Inputs: FP-IT



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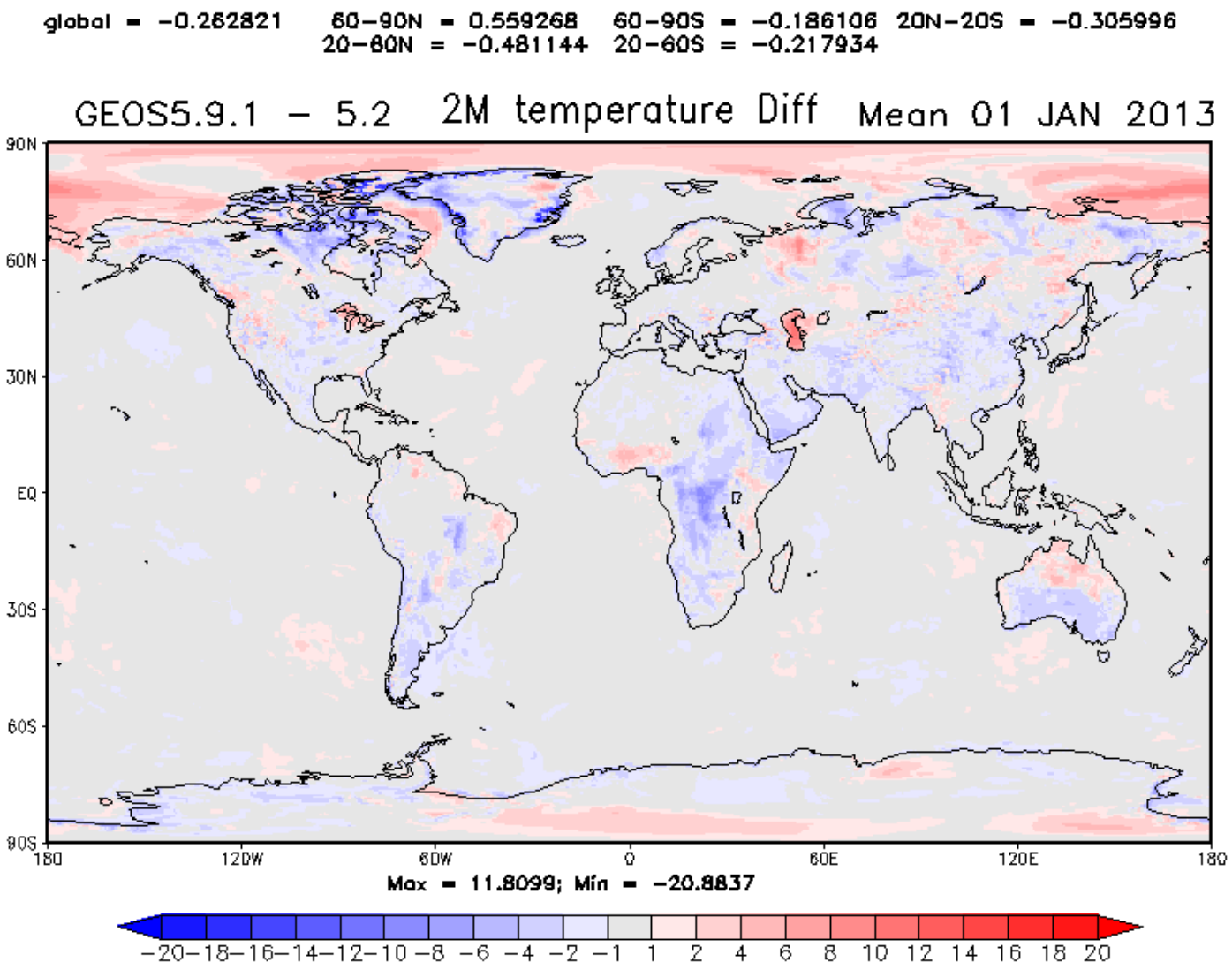

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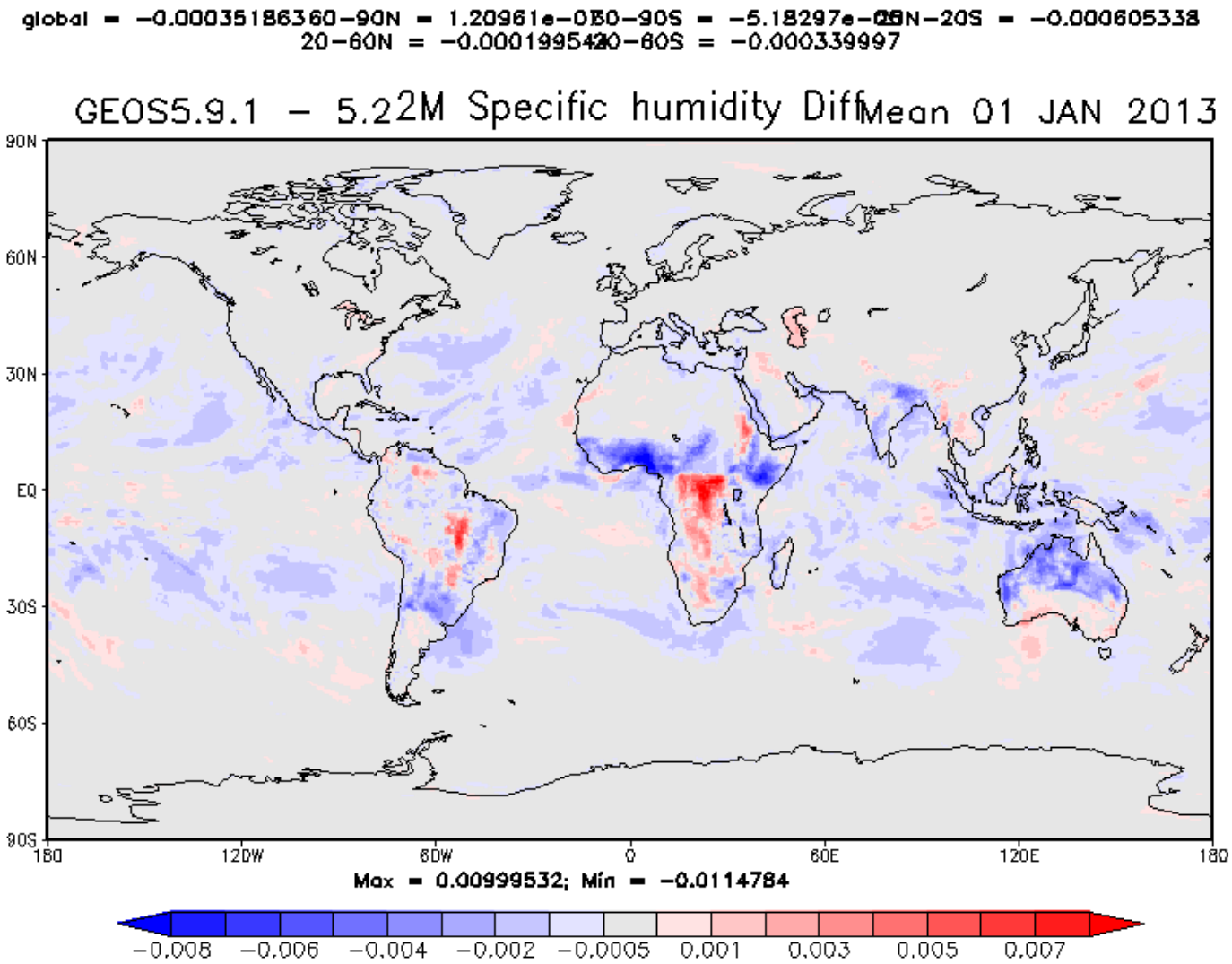

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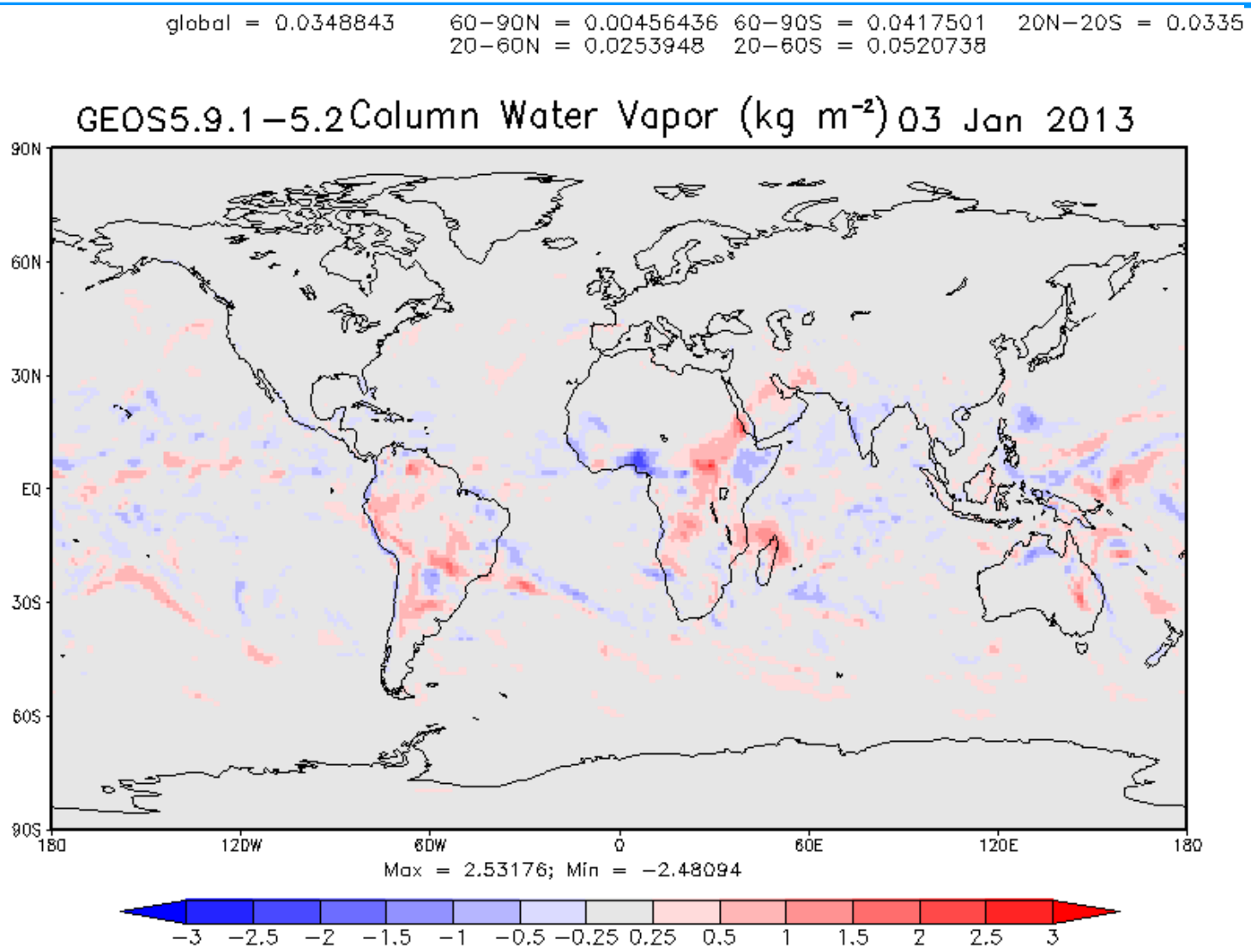


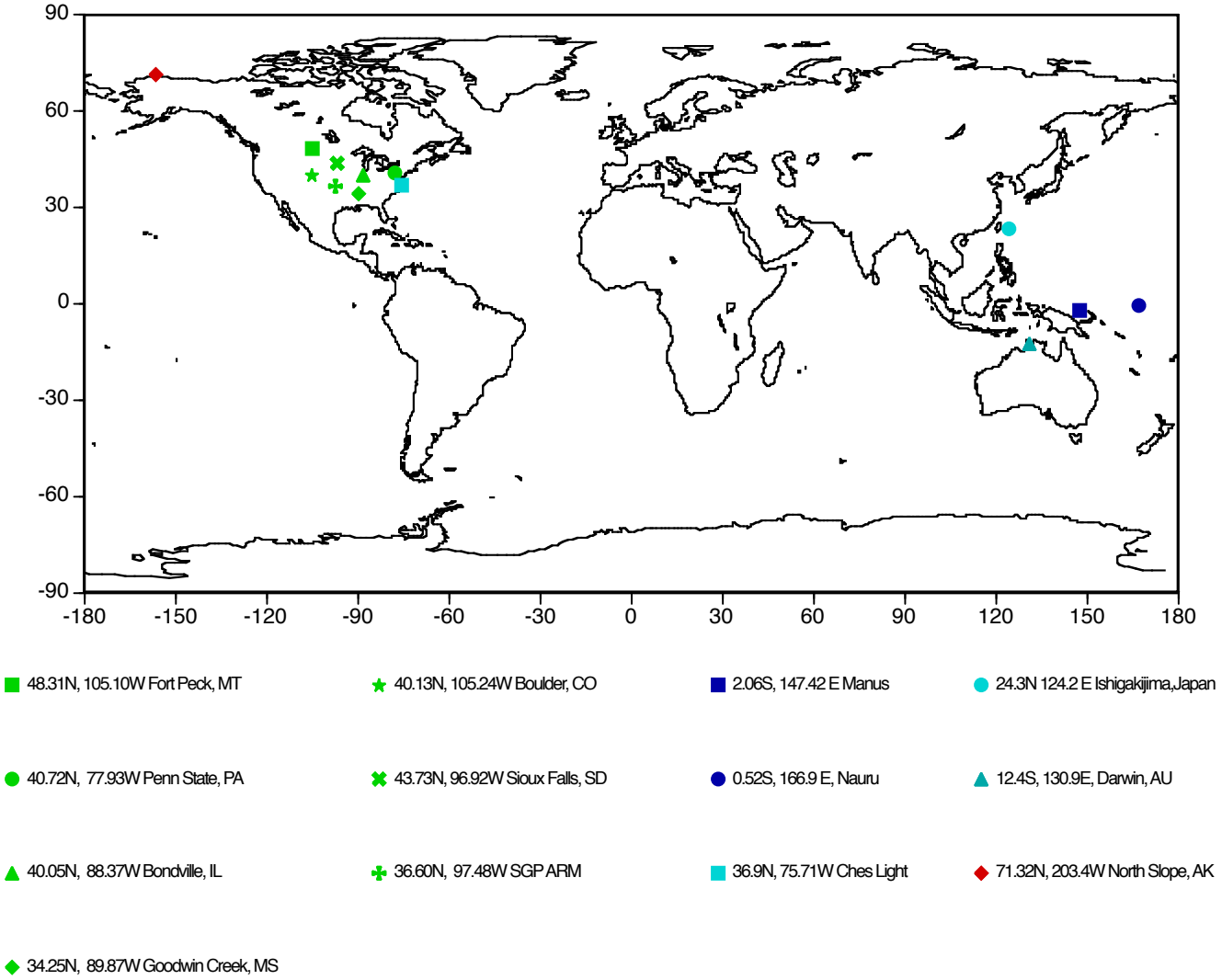
FLASHFlux SSF Data Products

CERES-like Single Scanner Footprint (SSF) (Terra and Aqua overpasses; 30 km nadir; 2H Processed through 3/31/2013

3A (not available yet) is processed through Feb 2013)

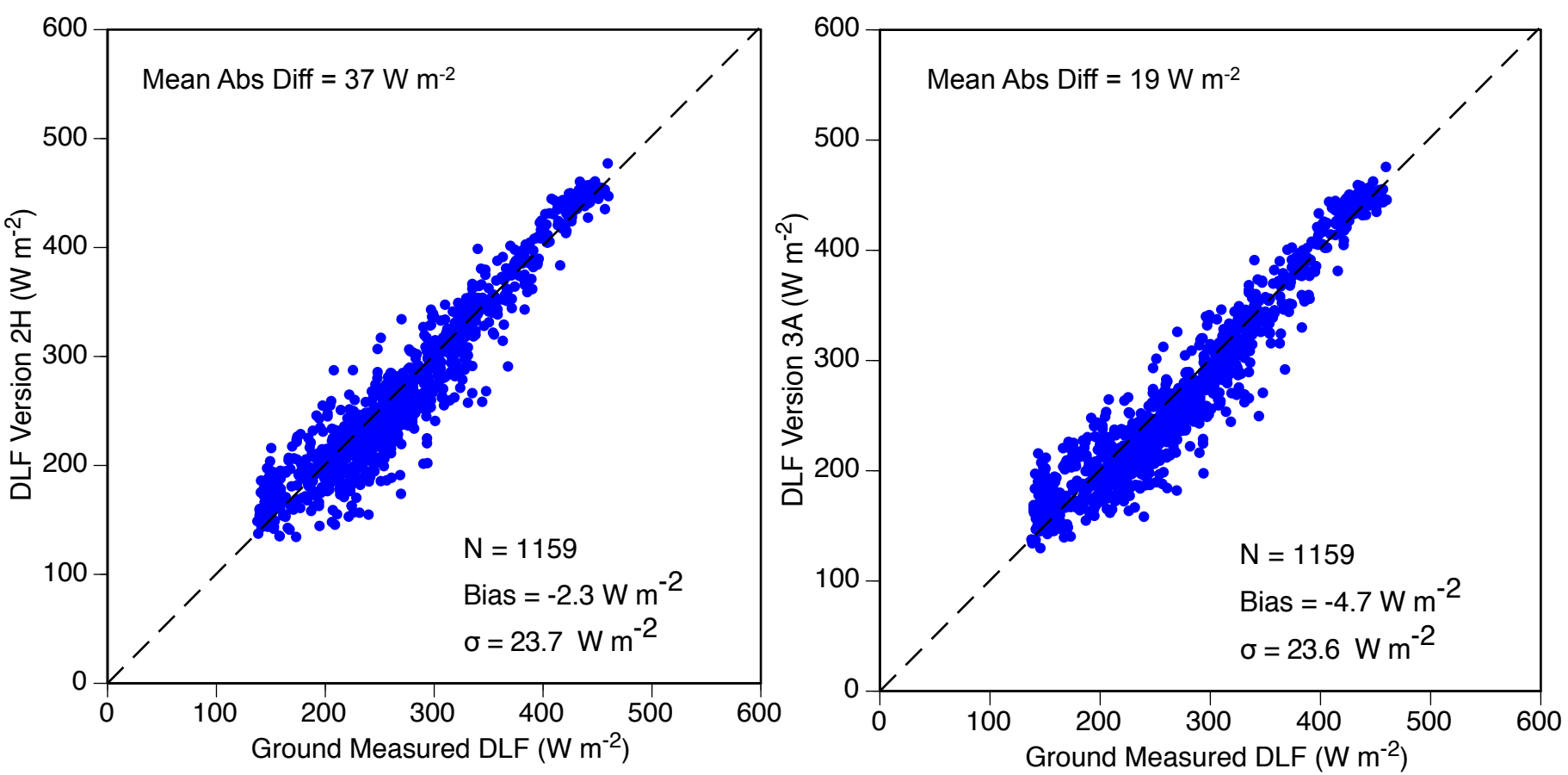
Early Surface Flux Validation

Only SurfRad and a few other sites available for Jan 2013



LW SSF Early Validation (Jan 2013)

Terra and Aqua

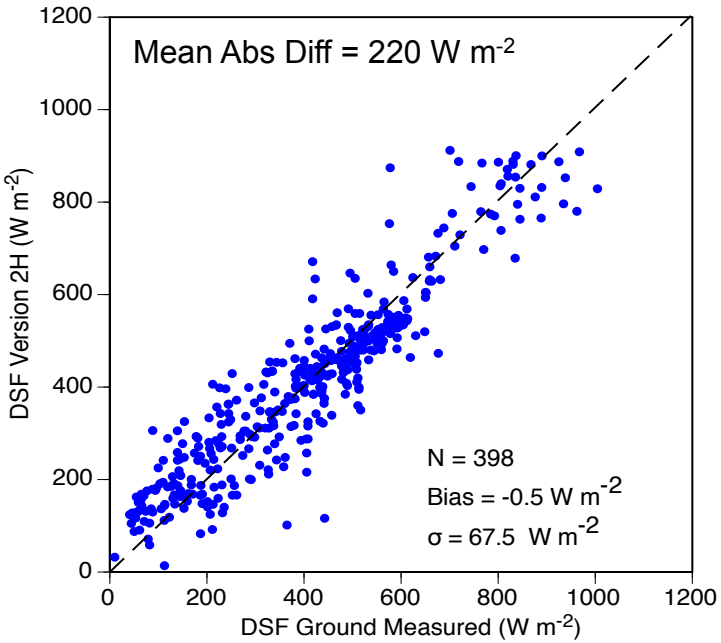


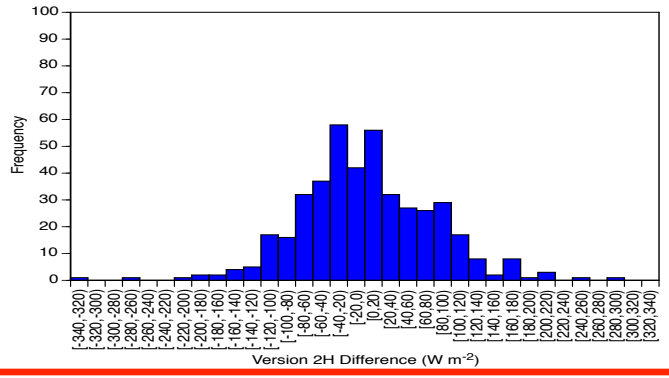
Instantaneous fluxes at overpass times

SW SSF Early Validation (Jan 2013)

Terra and Aqua

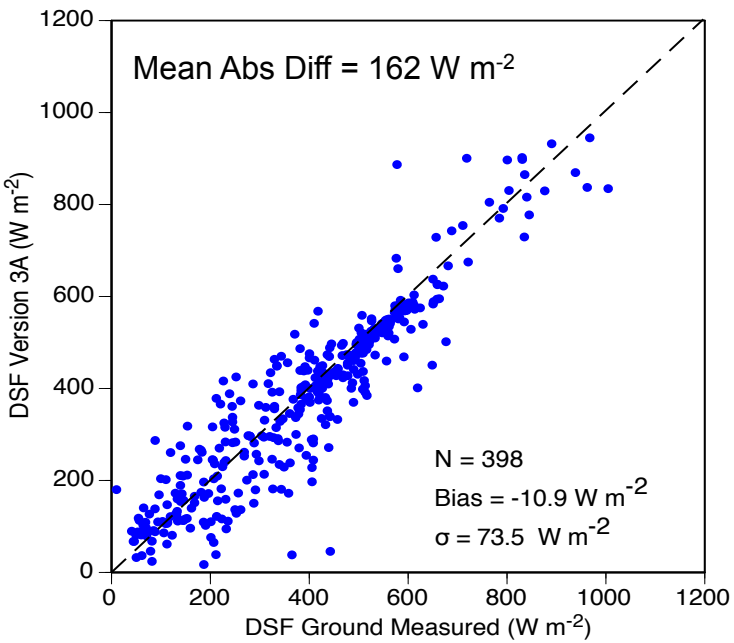
2H

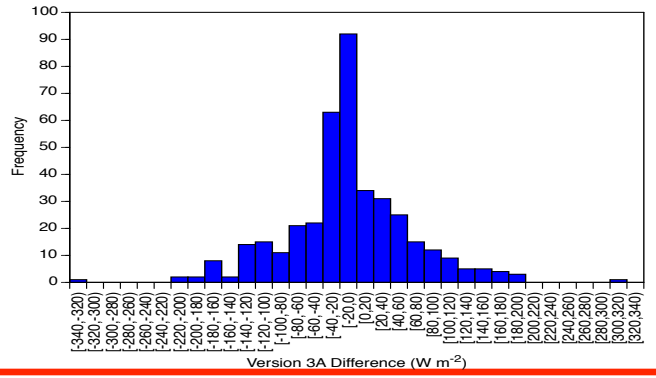




Surface SW flux measure-ments averaged +/- ½ hour overpass time

3A

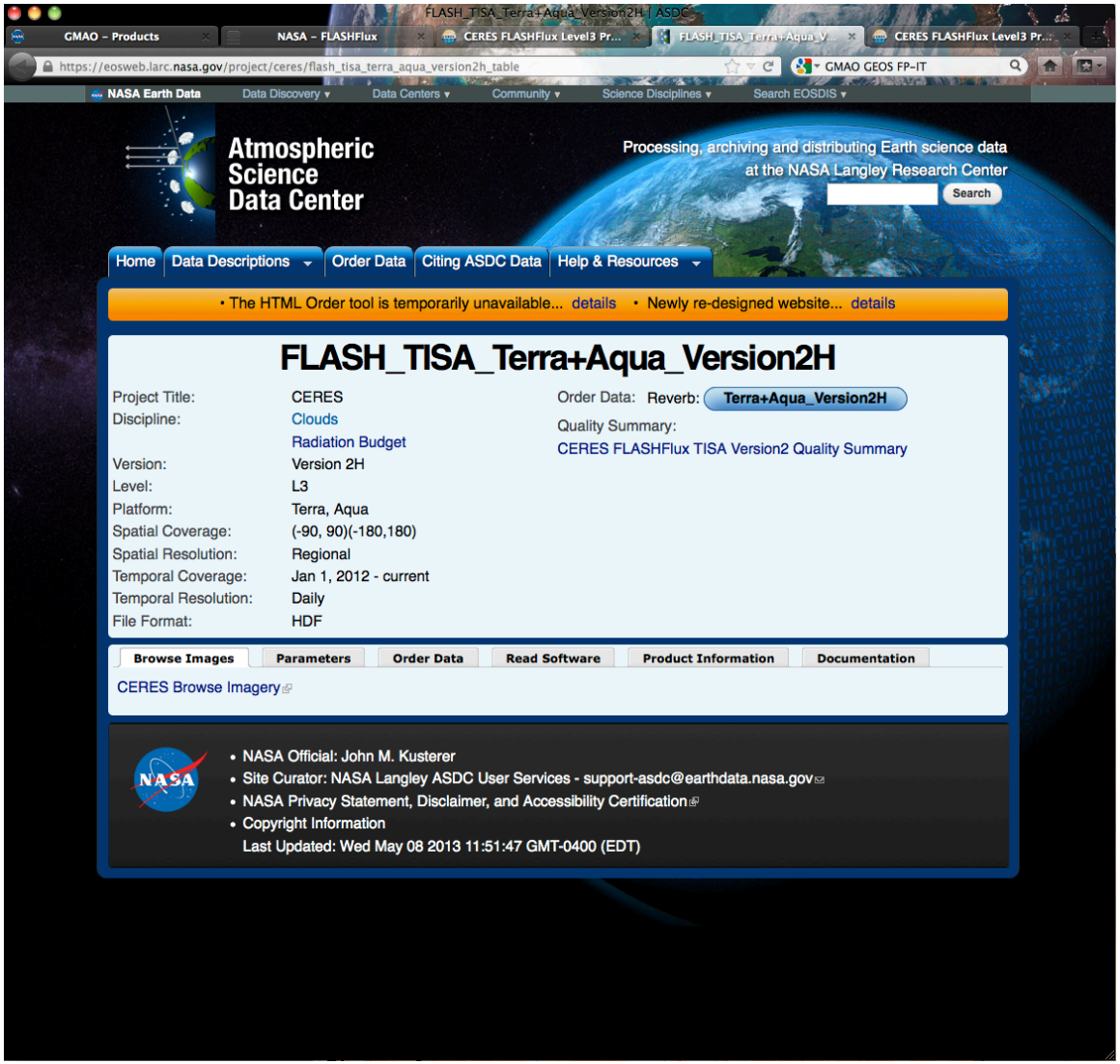




FLASHFlux Data Products

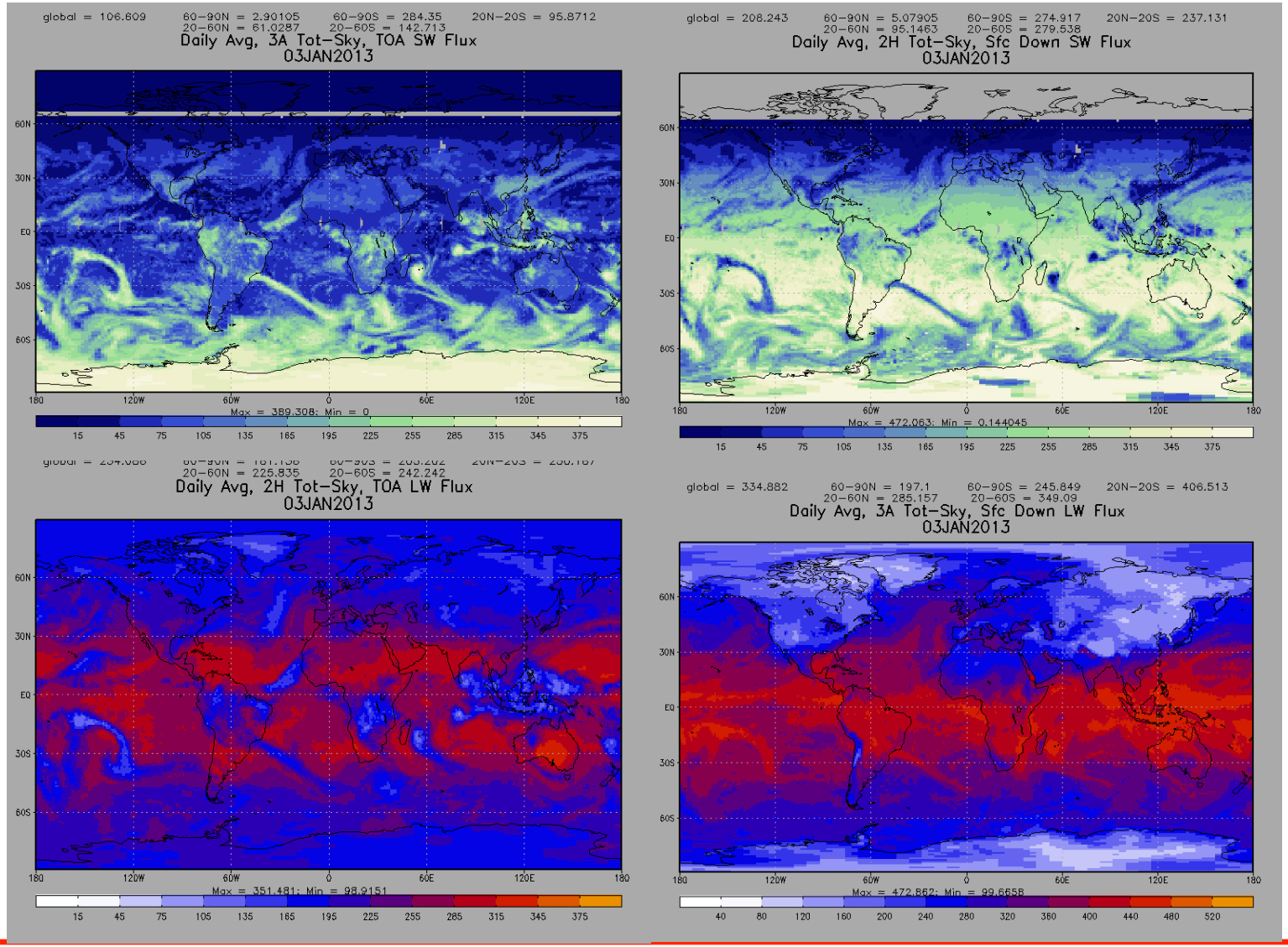
FLASHFlux Gridded and Temporally Averaged Data 2H Products (Terra+Aqua; Hourly/ Daily; 1°x1° resolution; Processed through about 3/31/2013)

3A not yet available



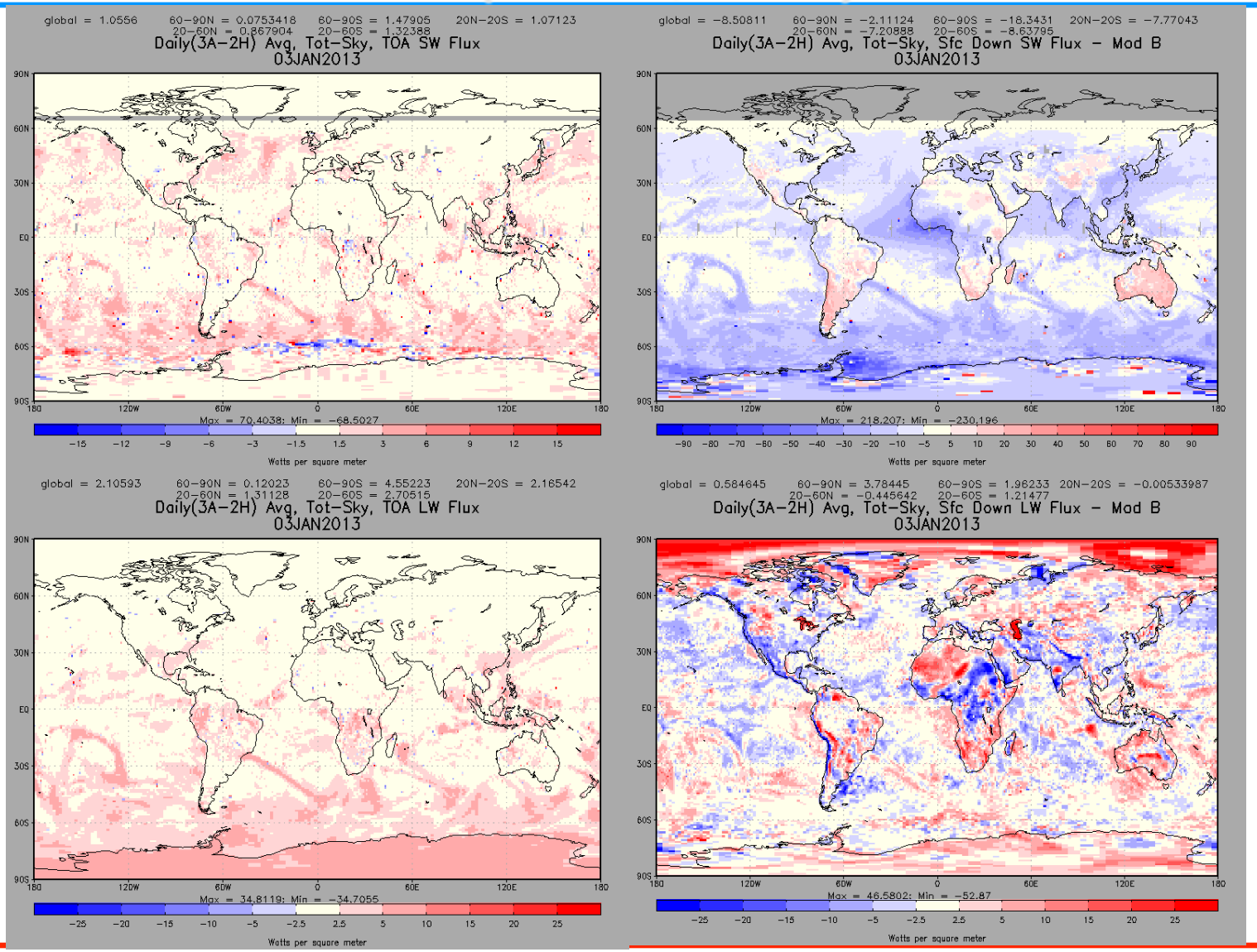
FLASHFlux Gridded and Temporally Averaged Data Products (Jan. 3, 2013)

(Terra +Aqua; Daily; 1°x1° resolution)



FLASHFlux TISA Product Differences (Jan. 3, 2013)

(Terra +Aqua; Daily; 1°x1° resolution)



Monitoring and Targeting Case: NASA LaRC Badge and Pass Office

SOUTHERN ENERGY MANAGEMENT
ENERGY EFFICIENCY & SOLAR POWER

Badge and Pass Office Solar Energy Project

ESG ENERGY SYSTEMS GROUP

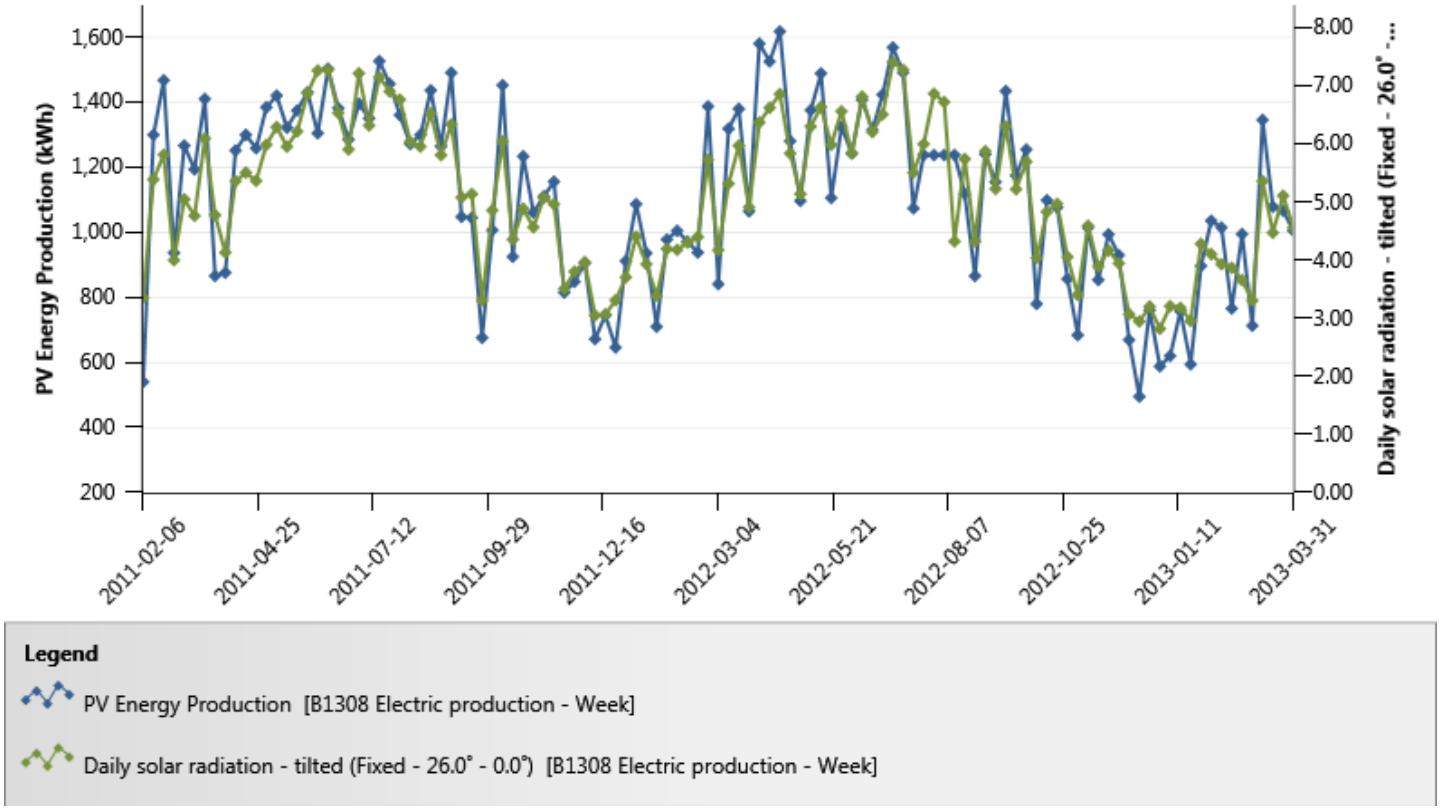
- Overview
- Current Status
- Weather Conditions

Installed in September 2010, this 39.5 KW ground-mounted solar energy system and will produce around 50,000 kilowatt-hours of electricity each year. The system consists of 168 photovoltaic modules mounted in two arrays located behind the Badge and Pass Office. This project demonstrates the performance of solar energy and the benefit of renewable energy being in our overall energy strategy.

Energy Today	Energy Yesterday	Lifetime Energy
193 kWh	206 kWh	38,035 kWh
Total energy generated by the system today	Total energy generated by the system yesterday	Total energy generated by the system since installation

Monitoring and Targeting Case: NASA LaRC Badge and Pass Office

Solar Panel Elec-trical Output (kWh)



FF 2H daily aver-aged SW fluxes

All points represent weekly average of daily inputs

(Results from RETScreen by Rene Ganoe)

Future Upgrades and Challenges

- ***FF data products to CERES subsetter***
- ***Continued refinement of algorithms:***
  - SW: Cloudy-sky transmission formula
  - Improve near-real time surface albedos anomalies
  - Aerosols: evaluation FP-IT compared to “Fast-MATCH”
- ***Adapt to MODIS Collection 6 (Ed 4 Clouds)***
- ***Improve consistency between CERES algorithms and FLASHFlux (TISA/SYN)***
  - Evaluate using GEO?
  - Adapt special version of TISA for monthly averaged maps
- ***Develop new products and subsets => parameterizations for the applications like solar industry***

Summary and Conclusions

- ***FLASHFlux publications:***
  - revise SSF paper; write TISA
  - Document SoC => reassess w/ EBAF 2.7

- ***FLASHFlux 3A***
  - Assess and evaluate 3A; validate as possible; complete DQS and promote to operational status
  - Reprocess at least of part of 2012 to provide longer time series with new algorithms and calibration

- ***FLASHFlux Is Working Towards …***
  - Increasing data accessibility with subsetting
  - Promoting various CERES upgrades for algorithms and subsystems
  - Expanding Applied Science usage

FLASHFlux Web Sites:

http://flashflux.larc.nasa.gov